

Notice of Allowability

Application No.

10/019,479

Examiner

Henry S. Hu

Applicant(s)

BAUER ET AL.

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment of July 15, 2004.
2. ☒ The allowed claim(s) is/are 7-16.
3. ☐ The drawings filed on _____ are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

1. Applicants' amendment filed on July 15, 2004 was received. Applicants' two attachments filed with amendment were also received.

Claims 7-10 were amended, original parent Claim 6 was cancelled, and new parent Claim 12 with new dependent Claims 13-16 were added. To be specific, new parent **Claim 12** was clarified with the paragraph separation of R¹⁻⁸, Z and R⁹ from Claim 6, other claims were corrected on claim dependency or typographical error as suggested by the examiner. With respect to the objection on using the recitation of "poly(perfluorocyclobutanes)", the Applicants have provided that **poly(perfluorocyclobutanes) is referred to PFCBs** as disclosed on page 9-II of Remarks. A new paragraph was submitted to replace the paragraph beginning on page 1 at line 4 accordingly. The examiner thereby withdraws the specification objection and claim objections for Claims 6 and 9 in the previous Office Action dated March 18, 2004. **Claims 7-16 are pending now.**

2. Claim rejections under 35 USC 103 in the previous Office Action dated March 18, 2004 are now removed for the reasons given in paragraphs 3-10 thereafter.

Allowable Subject Matter

3. Claims 7-16 are allowed.

4. The following is an examiner's statement of reasons for allowance: The above claims 7-16 are allowed over the closest references:

5. The limitation of new parent **Claim 12** of present invention relates to *an optical waveguide system or waveguide structure comprising at least (a) a first material which is a poly(perfluorocyclobutane), and in direct contact with this material (b) a second material which is a polycyanate resin, wherein the polycyanate resin has been (co)polymerized from at least one difunctional cyanate having formula (I) which is fluorinated and with factors R^{1-8} , Z and R^9 as specified in Claim 12. See other limitations of dependent Claims 7-11 and 13-16.*

6. In view of the Applicants' amendment, the new parent **Claim 12** of present invention is rewritten from the cancelled parent Claim 6 only to clarify with the paragraph separation of factors R^{1-8} , Z and R^9 , it still carries the same combination of limitations as original parent Claim 6 on "an optical waveguide comprises a **poly(perfluorocyclobutane) in direct contact with a polycyanate resin**" and "the polycyanate resin has been (co)polymerized from **at least one fluorinated difunctional cyanate as specified in formula (I)**".

With respect to **103 rejections** for original Claims 6-11, the primary reference **Kennedy** only discloses the preparation of a laminate having unique properties useful for making optical

waveguide and optical cladding, wherein the **lamine** has at least two layers, at least one of which comprises a polymer having more than one perfluorocyclobutane group. The architect of laminate thereby does read on the limitation of “the first polymer (a) is in direct contact with the second polymer (b)” in view of the layered structure. With respect to **the layer(s) other than** the layer(s) of polymer having perfluoro-cyclobutane (PFCB or FPAE) rings are epoxy resins, polyimides, benzocyclobutane (BCB) polymers, other thermosets, and the like (column 2, line 23-43).

7. Although Kennedy discloses that the preferable one is a thermoset polymer with different structure, composition and crosslinking type, but is **silent about specifically using polycyanates, which are related to one species of crosslinkable thermoset genus**. Attention is directed to that Kennedy does not disclose any cyanate species such as a fluorinated dicyanate therein. The secondary reference **Bauer** only discloses that polycyanate (or may be called polycyanurate) has been the major component in the course of making an optical waveguide, the advantage is that crosslinking can be easily obtained through the formation of a triazine ring, a practical process is thereby of high processability and low density and does not require excessive high temperature (abstract, line 1-4; column 1, line 9-18).

However, **Bauer fails to teach or fairly suggest combining PFCBs with polycyanates in the form of laminate structure**. Therefore, the motivations of (A) applying PFCBs with polycyanates together and (B) such a laminate to be used in the waveguide laminate structure are both lacking as also presented by the Applicants on pages 10-15 of Remarks. It is

Art Unit: 1713

noted that Bauer only uses one dicyanate as specified on column 2 at lines 27-39 which may have the claimed dicyanate structure. However, all other cyanates are not recited by present application.

8. In a close examination of the **search report for this Application's priority document EP 1,067,405 A1 to Bauer et al.**, the examiner confirms that **EP 0,490,335 A2 to Kennedy et al.**, **WO 96-11415 to Bauer et al.** and **EP 0,581,268 A1 to Tsunemi et al.** (cited as A) fail to teach or fairly suggest the particular combination of limitations of "an optical waveguide comprises a **poly(perfluorocyclo-butane) in direct contact with a polycyanate resin**" and "the polycyanate resin has been co-polymerized from **at least one fluorinated difunctional cyanate as specified in formula (I)**".

To be specific, "415" only discloses polycyanate resin useful for optical components; "268" only discloses phenylcyanates useful as a flame-retarded thermosetting resin composition; while "335" only discloses that PFCB is useful as a laminate component but does not disclose specifically applying PFCBs with polycyanates together.

Additionally, the present invention has shown in examples along with some comparative examples for unexpected results in obtaining an optical waveguide comprising a poly(perfluorocyclobutane) in direct contact with a polycyanate resin having the specified dicyanate (see pages 11-14 for **examples 1-7 along with its control example**). Therefore, all the above-mentioned

Art Unit: 1713

references, in combination or alone, does not teach or fairly suggest the limitations of present invention.

9. After further examination and search, the examiner found the following prior art did not teach the claimed limitation:

US Patent No. 5,208,892 and No. 5,165,959 to Burack et al. both only disclose **making an optical waveguide using triazine substantially and entirely** (see “892” on abstract, line 1-2; column 1, line 56-59; column 2, line 38-58; also see “959” on abstract, line 1-3; column 1, line 56-59; column 2, line 38-58). It is noted that **triazine is a polyxycyanate or may be called polycyanurate.** No PFCB is disclosed to be used in making wavguide and to be in direct contact with triazine, polycyanate or polycyanurate.

US Patent No. 5,037,917 to Babb et al. both only disclose the preparation of perfluorocyclobutane ring-containing polymers having a backbone comprising hydrocarblyl groups, perfluorocyclobutane rings and non-carbon atoms (title; abstract, line 1-12). No application on PFCB is disclosed to be used in making wavguide and to be in direct contact with triazine, polycyanate or polycyanurate.

10. The key issue, the specific combination of limitations on “an optical waveguide comprises a poly(perfluorocyclobutane) in direct contact with a polycyanate resin” and “the polycyanate resin has been co-polymerized from at least one fluorinated difunctional cyanate as

Art Unit: 1713

specified in formula (I)", cannot be overcome by any or the combination of the above references, therefore, the present invention is novel.

11. As of the date of this office action, the examiner has not located or identified any reference that can be used singularly or in combination with another reference including the above references to render the present invention anticipated or obvious to one of the ordinary skill in the art. Therefore, the independent and parent **Claim 12** is allowed for the reason listed above. Since the prior art of record fails to teach the present invention, the remaining pending dependent **Claims 7-11 and 13-16** are passed to issue.

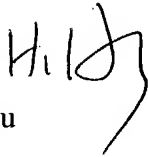
12. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance".

13. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Henry S. Hu whose telephone number is **(571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The fax number for the organization where this application or proceeding is assigned is (703) 872-9306 for regular communications.

Art Unit: 1713

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Henry S. Hu

September 27, 2004



DAVID W. WU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700